

REMARKS

Claims 1-11 and 13-21 are pending. By this amendment, the title is amended; the specification is amended; claim 12 is canceled without prejudice or disclaimer; claims 1, 4, 7, 10, 11, 13, 15 and 16 are amended; and claims 19-21 are added. Reconsideration in view of the amendments and following remarks is respectfully requested.

Applicants respectfully note that claim 18 was not rejected. It is respectfully submitted that claim 18 is allowable. Indication of such allowability is respectfully requested.

The title of the invention was objected to. The title has been amended in accordance with the suggestion of the Office Action. Reconsideration and withdrawal of the objection to the title are respectfully requested.

Claims 7-10 were objected to. Claims 7 and 10 have been amended in accordance with the suggestion of the Office Action. Reconsideration and withdrawal of the objection to claims 7-10 are respectfully requested.

Claims 1 and 6-17 were rejected under 35 U.S.C. §102(e) over Jain et al. (U.S. Patent 6,304,316). The rejection is respectfully traversed.

Claim 1 recites a lithographic projection apparatus including a radiation system, a support structure to support a patterning structure, a substrate table, a projection system to project a patterned beam onto a target portion of a substrate, the projection system having a focal plane and including at least one adjustable refractive optical element capable of changing the shape of the focal plane, and a controller, operative during an exposure to image the irradiated portion, to control the adjustable optical element to change the shape of the focal plane to improve conformity to the surface contour of the exposure area, wherein a magnification of the projection system is not equal to one.

Claim 13 recites a device manufacturing method including projecting a patterned beam of radiation onto a target portion of a layer radiation-sensitive material on a substrate, and controlling an adjustable refractive optical element of a projection system used for the projecting, during the projecting, to change shape of the focal plane to improve conformity to a surface contour of the target portion, wherein the magnification of the projection system is not equal to one.

Jain et al. disclose a microlithography system for high-resolution large-area patterning on curved surfaces in which a pattern on a mask 2 is imaged on a substrate 1 by a 1:1 projections lens 5 which is stationary and situated above a scanning stage 3. In one

embodiment, a variable phase plate 14 is provided for moving the focal plane with respect to the substrate 1. See column 9, lines 5-8. There is no disclosure or suggestion by Jain et al. of changing the shape of the focal plane by controlling the variable face plate 14. In another embodiment, a deformable mirror 22, which is a reflective element and not a refractive element, is provided to create an image field with an appropriate curvature so as to optimally match the curvature of the substrate 1. See column 10, lines 61-65.

There is no disclosure or suggestion by Jain et al. of a projection system including at least one adjustable refractive optical element capable of changing shape of a focal plane and a controller operative during an exposure to control the adjustable refractive optical element to change the shape of the focal plane, as recited in claim 1. There is no disclosure or suggestion by Jain et al. of controlling an adjustable refractive optical element during projecting to change the shape of a focal plane, as recited in claim 13. Jain et al. disclose a deformable reflective element (the mirror 22) placed after the projection lens 5 to change the shape of the focal plane.

Claims 6-12 and 14-17 recite additional features of the invention and are allowable for the same reasons discussed above with respect to claims 1 and 13 and for the additional features recited therein. In particular, it is respectfully noted that claim 11 has been rewritten in independent form to recite that the adjustable refractive optical element is field-curvature correction lens. Jain et al. do not disclose or suggest an adjustable refractive optical element that is a field-curvature lens. Jain et al. merely disclose the variable phase plate 14 for moving the focal plane of the projection lens 5 up and down in the vertical direction and the deformable mirror (reflective element) 22 placed after the projection lens 5 to change the shape of the focal plane.

Reconsideration and withdrawal of the rejection of claims 1 and 6-16 under 35 U.S.C. §102(e) over Jain et al. are respectfully requested.

Claims 1, 6-10 and 13-17 were rejected under 35 U.S.C. §102(b) over Van Den Brink (U.S. Patent 5,801,832). The rejection is respectfully traversed.

The Office Action on page 3, lines 14-15 alleges that Van Den Brink discloses at least one adjustable optical element capable of changing the shape of a focal plane in column 12, lines 20-25. It is respectfully submitted, however, that Van Den Brink does not disclose or suggest changing the shape of a focal plane, as recited in claims 1 and 13.

As disclosed in column 12, lines 20-25 of Van Den Brink, the projection apparatus comprises a focus error detection system for determining a deviation between the focal plane of the projection lens system PL and the surface of the substrate W so that this deviation can

be corrected, for example, by moving the projection lens system along its axis. Van Den Brink, thus, discloses moving the focal plane along the optical axis of the apparatus, but does not disclose or suggest changing the shape of the focal plane. Accordingly, Van Den Brink cannot anticipate or render obvious claims 1 and 13.

Claims 6-10 and 12-17 recite additional features of the invention and are allowable for the same reasons discussed above with respect to claims 1 and 13 and for the additional features recited therein.

Reconsideration and withdrawal of the rejection claims 1, 6-10 and 13-17 under 35 U.S.C. §102(b) are respectfully requested.

Claims 2-5 were rejected under 35 U.S.C. §103(a) over both Jain et al. in view of Wakamoto et al. (U.S. Patent 6,118,515) and Van Den Brink in view of Wakamoto et al. The rejections are respectfully traversed.

Claims 2-5 recite additional features of the invention and are allowable for the same reasons discussed above with respect to claim 1. Further, it is respectfully submitted that Wakamoto et al. fail to cure the deficiencies of claim 1 of both Jain et al. and Van Den Brink, namely, Wakamoto et al. fail to disclose or suggest controlling an adjustable refractive optical element to change the shape of a focal plane. Accordingly, even assuming it would have been obvious to combine Wakamoto et al. with either Jain et al. or Van Den Brink, such combinations would not result in the invention of claim 1.

Reconsideration and withdrawal of the rejection of claims 2-5 under 35 U.S.C. §103(a) are respectfully requested.

New claims 19-21 recite additional features of the invention and are allowable for the same reasons discussed above with respect to claims 1 and 13 and for the additional features recited therein. For example, claims 19 and 21 depend from claims 1 and 13, respectively, and recite that a magnification ratio of the projection system is not equal to unity. Jain et al. disclose that the magnification ratio of the projection lens 5 is unity. Jain et al. do not disclose or suggest magnification ratios not equal to unity. It is also respectfully submitted that one of ordinary skill in the art would not have provided a magnification ratio not equal to unity to the projection lens 5 of Jain et al. Jain et al. disclose that the positions of the substrate holder 10 and the mask holder 9 are fixed relative to each other on the scanning stage 3 (see independent claims 1, 7, 9, 12, 16 and 20 which recite that the mask 2 and the substrate 1 are in fixed juxtaposition). As the mask 2 and the substrate 1 are in fixed juxtaposition, only a magnification ratio of unity can be utilized with the system of Jain et al. New claim 20 recites that the support structure and the substrate table are movable relative to

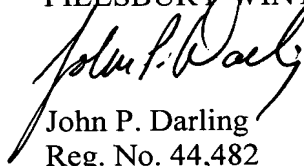
each other in a plane perpendicular to the optical axis of the apparatus, which as discussed above Jain et al. do not disclose or suggest.

In view of the above amendments and remarks, Applicants respectfully submit that all of the claims are allowable and that the entire application is condition for allowance.

Should the examiner believe that anything further is desirable to place the application in better condition for allowance, the examiner is invited to contact the undersigned at the telephone number listed below.

Respectfully submitted,

PILLSBURY WINTHROP LLP



John P. Darling

Reg. No. 44,482

Tel. No. (703) 905-2045

Fax No. (703) 905-2500

Date: October 15, 2003

P.O. Box 10500
McLean, VA 22102
(703) 905-2000